

IziPest

Expertise
Faune
Invasive



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Insect as a pest

Biology, impact and management

Case of Bed bug management



March 2016

1

1. Insect: sanitary problematic

2

2. Insect: main commensal species

3

3. Actual management way

4

4. Efficacy and resistance problematic

5

5. Case of Bed bug management

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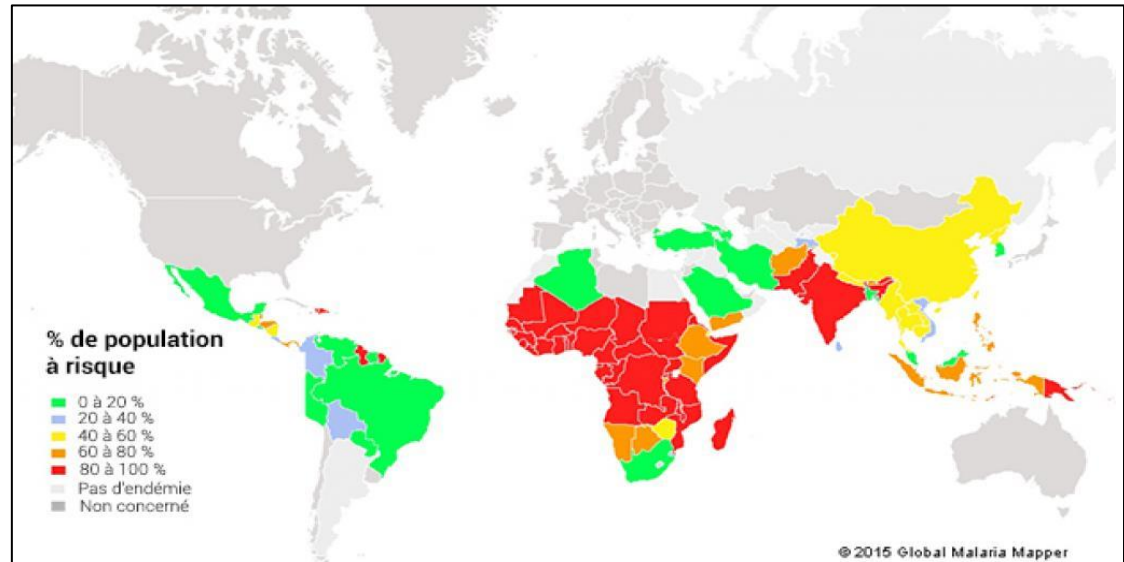
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Insect: a sanitary problematic

- Large impact of invasive insects and mites on human health



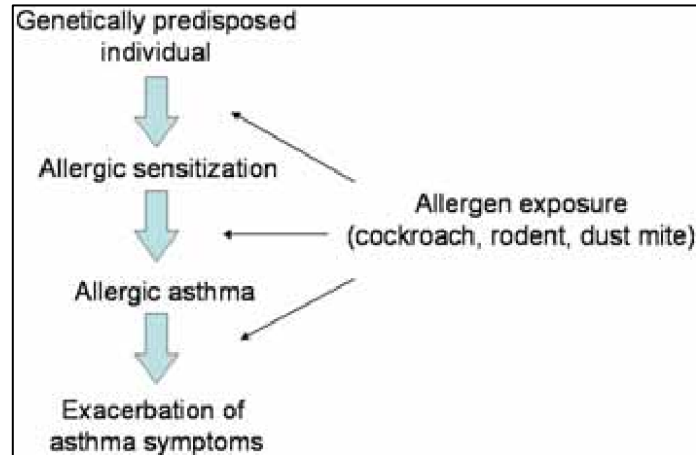
Insect: a sanitary problematic

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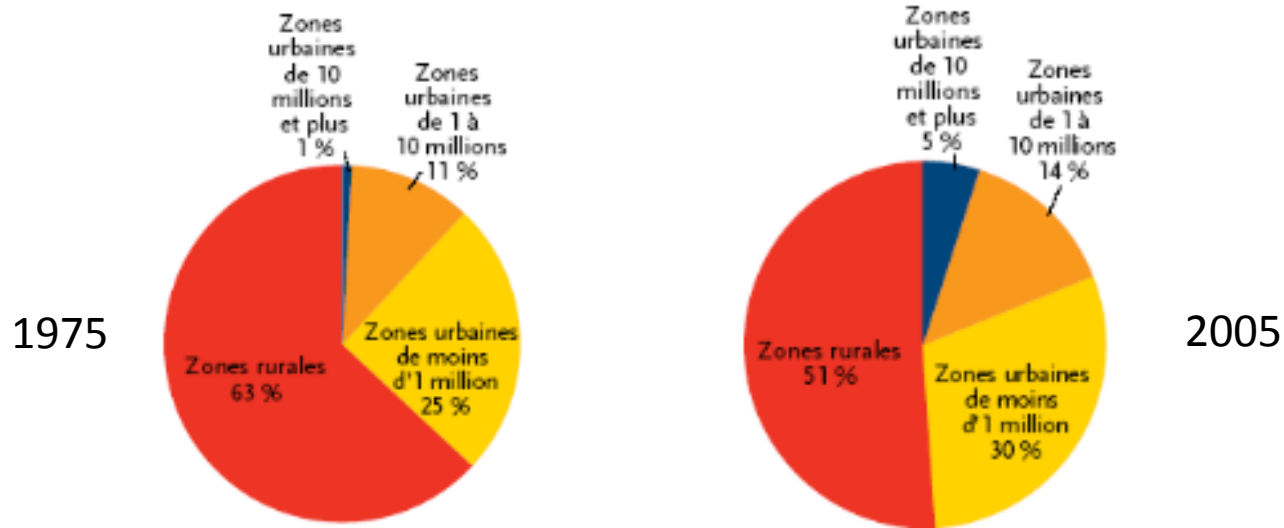


Insect: a sanitary problematic

- Large impact of invasive insects and mites on human health



- Urban pest concentrate in cities along the human concentration



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Insect: commensal species

- Main commensal insect species: need of human to grow & to live



Need of access to blood to develop
from larva to adult
(hotel and private house problematic)



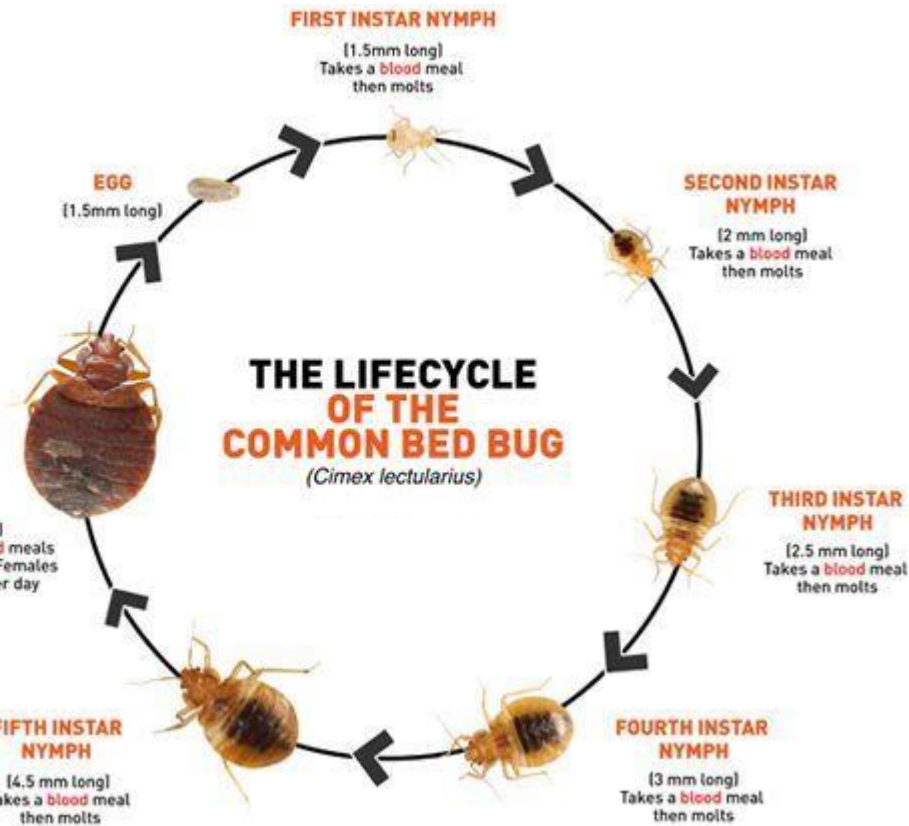
Need to access to food waste blood
(restaurant and private house problematic)



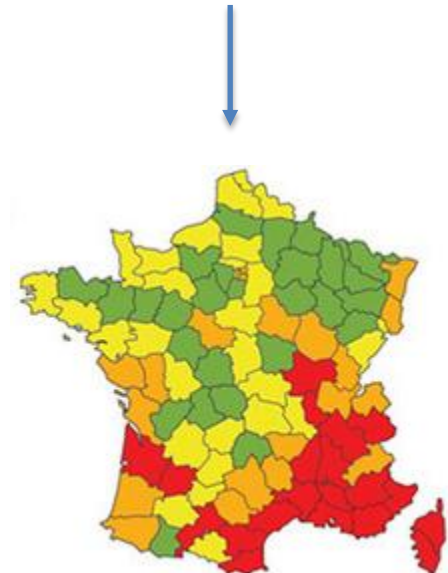
Need to access to mammal blood to lay
(global disease spreading problematic)

Insect: commensal species

- Main commensal insect species: need of human to grow & to live

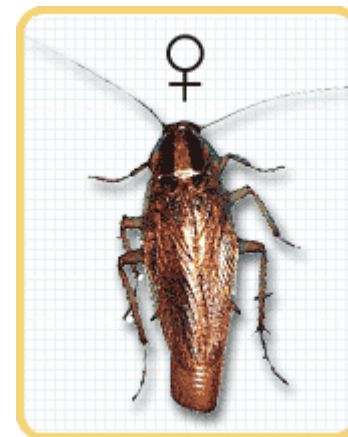
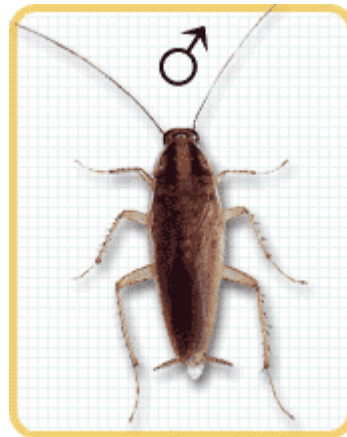
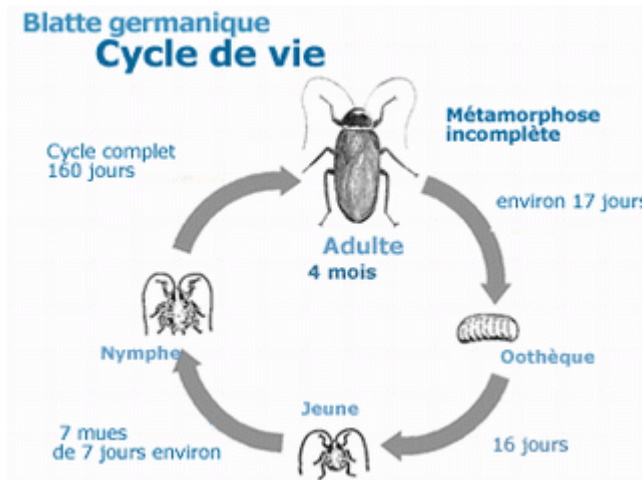


Fast development
Can be easily transported
By cars, trucks, in tourist luggages



Insect: commensal species

- Main commensal insect species: need of human to grow & to live



Problematic

Eggs not at the same place than larva and adults
Can be easily transported
By cars, trucks, food
Discret when population is low



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Way of insect control

Insecticide active ingredient are often acaricide

Classical chemical control

organophosphorus , carbamate, pyrethroid, organochlorine, neonicotinoids, benzoylurea

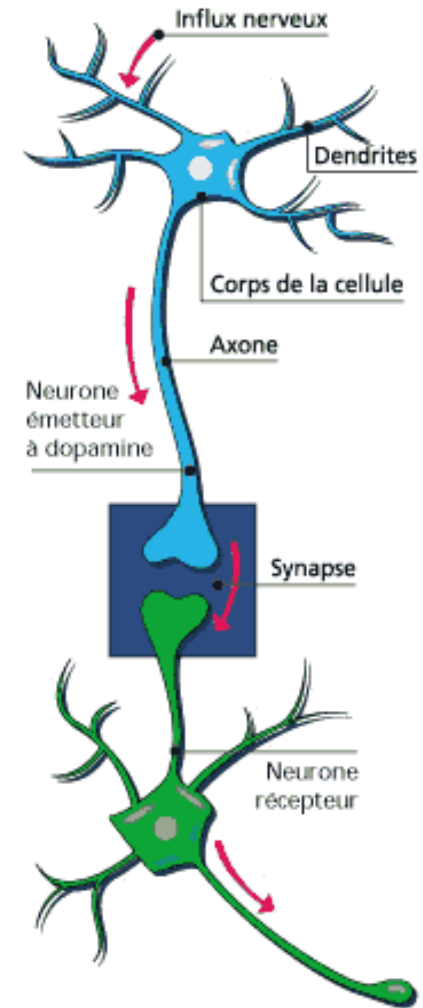
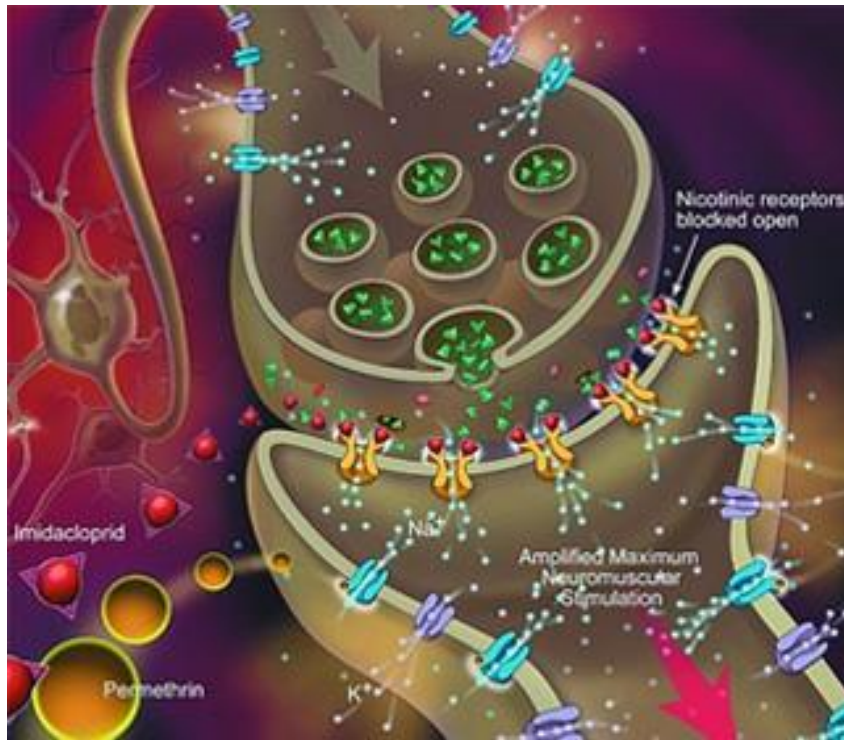
2 mode of action:

action on central nervous system (majority of insecticides)
action by chitin inhibition

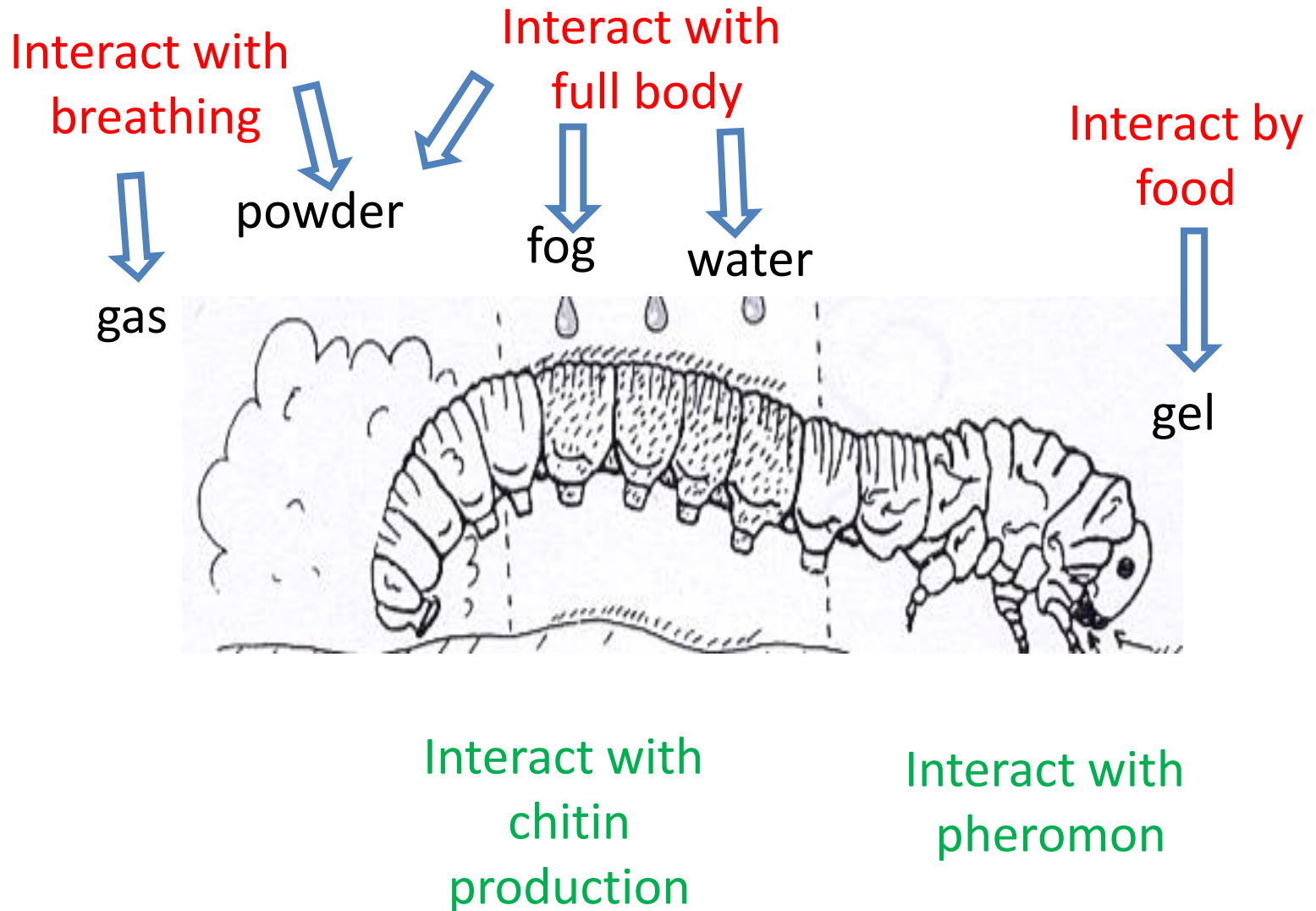
Biological control (population monitoring)

action by sexual confusion (pheromone trapping)
action by spreading of larva pathogens (bacteria as *Bacillus thuringiensis*)

Way of insect control



Sommaire



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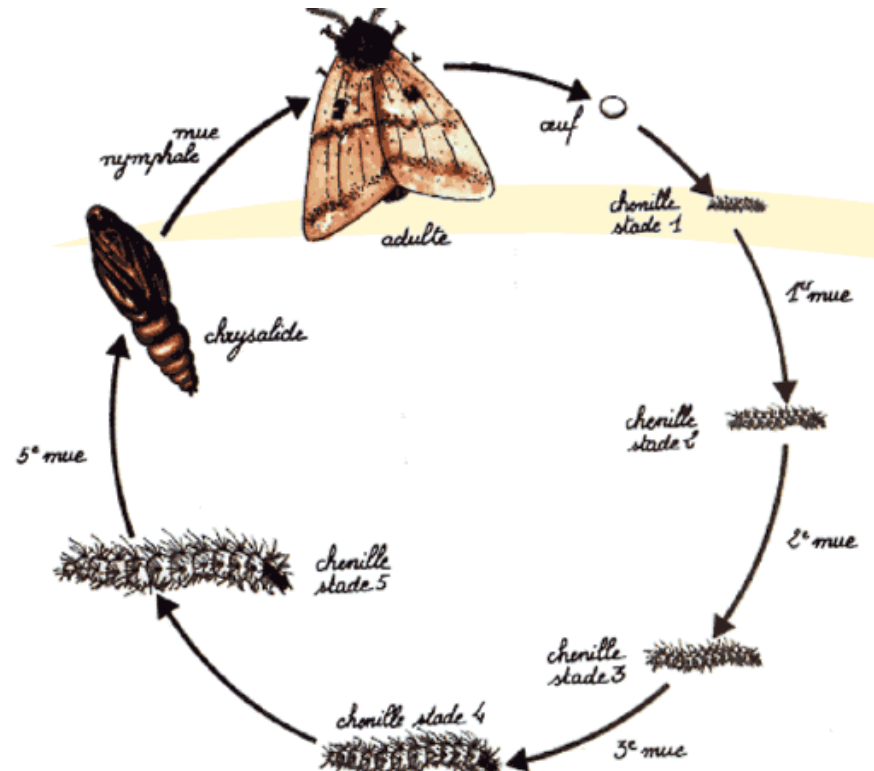
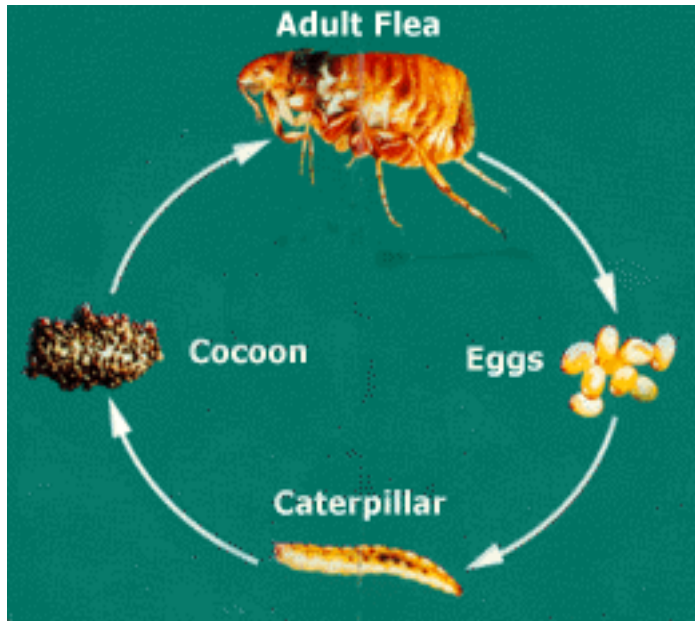
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Efficacy and resistance

Treatment efficacy depending on the insect stage of development

- egg
- larva
- adult



Efficacy and resistance

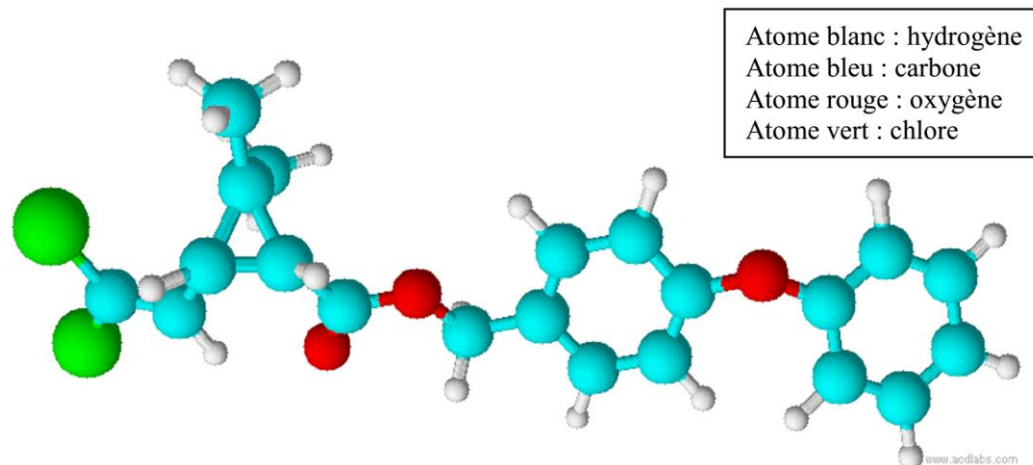
Insect control

Pyrethroid compound from first generation (permethrin) were widely used as insecticides and acaricides for non crop applications

Quick action, specific active ingredient

Moderate toxicity for mammals except cats

Susceptible to insect resistance due to esterase equipment: reason of seconde generation development

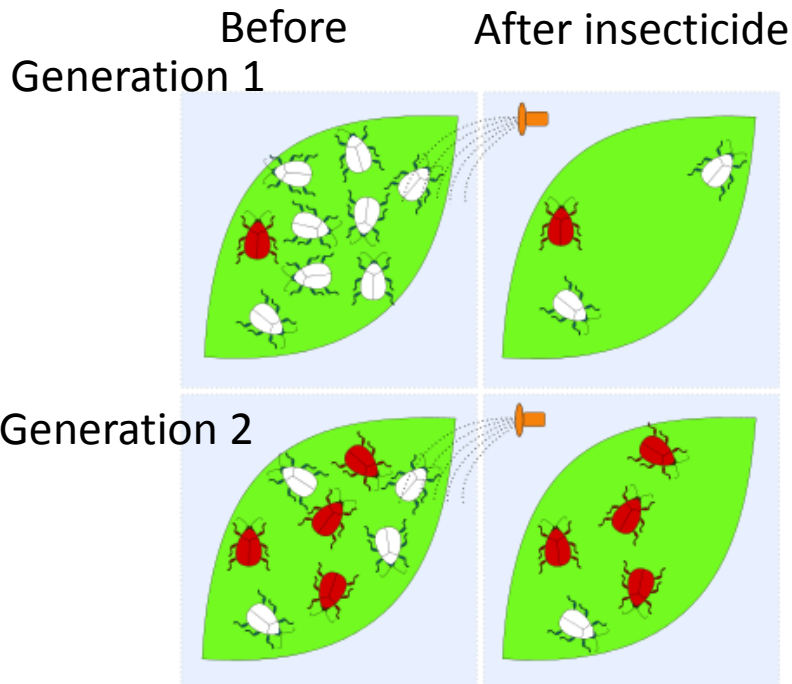


Sommaire

Insect control

Lot of insect develop resistance to permethrin
Cockroach, mosquitoes, bed bugs...

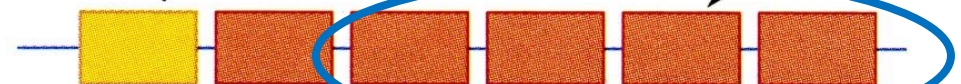
Necessity to use
Pyrethroid from
second generation



Moustiques sensibles



Moustiques résistants



■ Gène *ester3*

■ Gène *ester2*

DOCUMENT 11 Les gènes *ester3* et *ester2* codent des enzymes, les estérases, qui agissent sur les insecticides organophosphorés en les empêchant d'atteindre leur cible au sein de l'organisme.

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Case of bed bugs management



From diagnostic to control



- Increasing population since DDT stop
- Sting is the main index
- Both sexe are bloodsuckers
- Identification of adult location
- Bigger is the size of population, more important is probability of presence of eggs, larva and adults
- Diagnostic and site management before treatment are essential steps
- Development of permethrin resistance
- Susceptible to chitin inhibitor



From diagnostic to control



Quelques données de biologie	
Durée d'un repas sanguin	10-20 mn
Temps entre 2 repas extrêmement variable (jusqu'à 2 ans)	3-15 jours
Espérance de vie d'un adulte	6-24 mois
Nombre total d'œufs pondus par une femelle adulte	200-500 œufs
Rythme de ponte d'une femelle adulte	5-15 œufs/jour
Durée du cycle de vie (œuf à œuf)	40-70 jours
Délai de ponte après fécondation	3-10 jours
Phase d'éclosion des œufs	7-15 jours
Temps entre 2 stades larvaires (repas sanguin obligatoire)	3-15 jours



From diagnostic to control

**Problem
discovering**



30 min after bites



48h after bites

**Recent if adults
only**

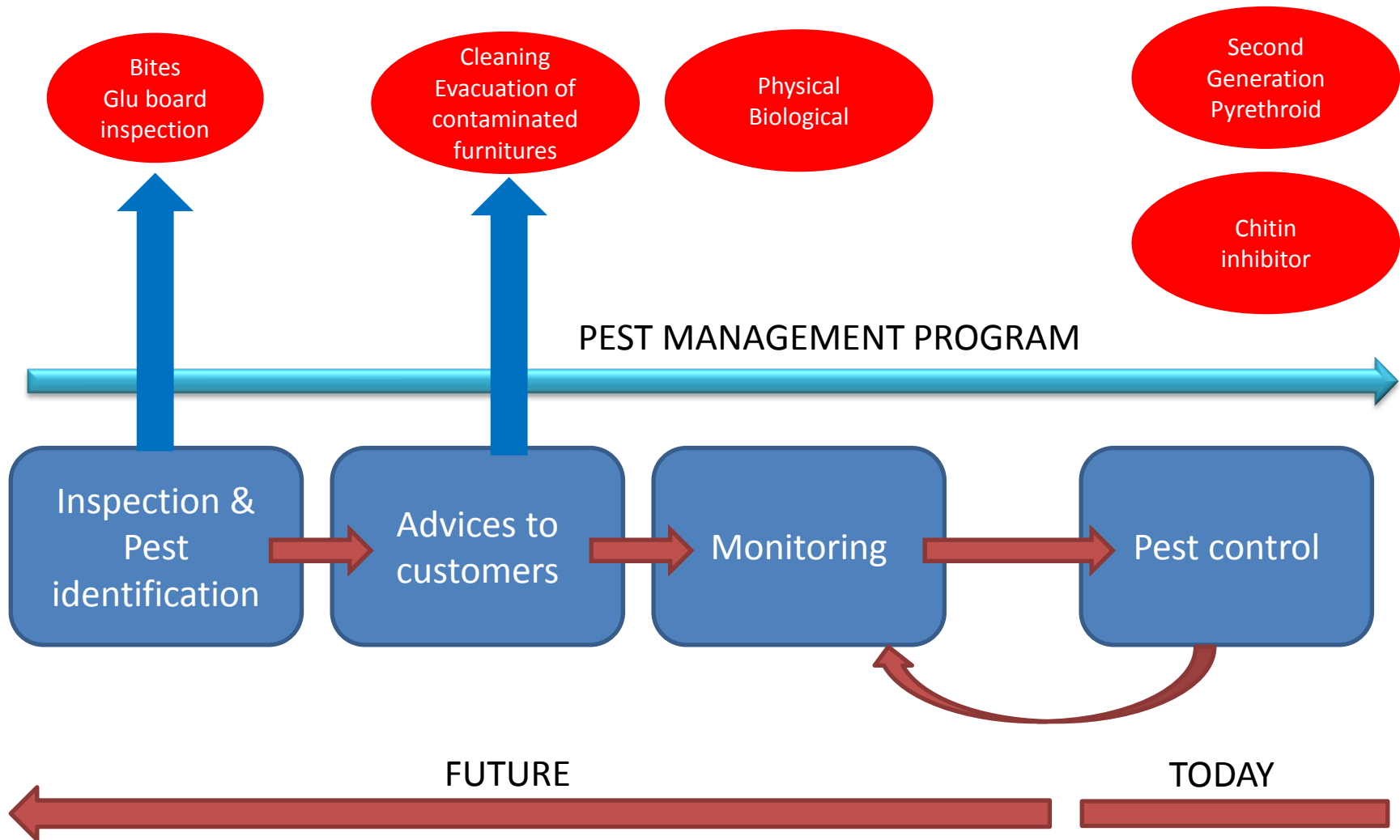


**Old if eggs and
larva**



**Problem
screening**

From diagnostic to control



From diagnostic to control

OPERATION PROCESS IN THE FIELD

1) Exemple of Etofenprox use to control adult and larva (last stage)

– Second generation of Pyrethroid:

- most effective than permethrin
- No resistance at all: do not contain ester function
- conserve good environmental profile of pyrethroid regarding other insecticides

2) Chitin inhibitor use: to control first stage larva growing (6-8 days after Etofenprox treatment)

3) Second Etofenprox use to control larva and adult that come from eggs (15 days after first etofenprox application)

- Application of products by spraying or nebulizer depending of population size and type of site
- Monitoring after treatment to detect new bed bug invasion

Thank you !



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